

Test Methods for Solidified Waste Evaluation

"Scientists and engineers from WTI have been involved with the regulatory community for many years and have been active in advocating scientifically based evaluation of environmental technologies. The approach used for developing the WTI procedure for evaluating solidified waste is gaining acceptance worldwide. This project helped to establish a global leadership role for Canada in evaluating the potential for waste to migrate from its containment area."

Herb Campbell
Vice President
Water Technology International Corp.
Burlington, Ontario

THE COMPANY

Water Technology International Corp. (WTI) is an employee-owned company with more than 25 years of experience in providing environmental technologies and services in five business units: pollution prevention, pollution control, site remediation, residue management and environmental chemistry. As operator of the Wastewater Technology Centre (WTC) and the Canadian Clean Technology Centre, WTI has the people, facilities and equipment to provide cost-effective solutions to environmental problems.

THE CHALLENGE

Some wastes are solidified or stabilized to improve their physical and chemical characteristics before they are used or disposed of. Although a great variety of test methods have been developed all over the world, there is no standard procedure for evaluating the effectiveness of a stabilization / solidification process. WTC has proposed a series of test methods for evaluating the intrinsic physical and chemical properties of a solidified waste (Environment Canada Report EPS 3/HA/9) which affect its ability to retain contaminants over the long term, in a variety of scenarios. Previous work has provided an exten-



Test cell for a field validation study.

sive background database of the properties of state-of-the-art solidified waste. This project focused on investigating the relationship between properties measured in the laboratory and the behavior of solidified waste in the field.

TECHNOLOGY DESCRIPTION

Stabilization/solidification of hazardous wastes by mixing them with hydraulic or cement-based binders, such as portland cement or power plant fly ash, usually results in a strong, durable compound which is not easily penetrated by liquids. Solidification can immobilize contaminants in two ways:

- 1) by chemically binding them in an insoluble form;
- 2) by physically trapping them in a rigid, impermeable and durable compound.

Solidification technology is most commonly used to prevent contaminants leaching from inorganic wastes which cannot be recycled or reused. Appropriate evaluation of solidified wastes is essential to ensure protection of the environment.

RESULTS

The field validation study for the WTC procedure for evaluating solidified waste involved placing 63 cubic metres of electric arc furnace dust, solidified with an activated blast furnace slag binder, in a field test cell. Monitoring of the solidified waste in the field test cell included:

- 1) testing cores of solidified waste from the field test cell in parallel with field samples archived and cured in the laboratory at different ages, according to the 12 physical and leaching tests of the procedure;
- 2) measurement of the generation of leachate and the collection and analysis of leachate samples from the field test cell.

Based on the results, a revised laboratory procedure and a procedure for solidification field practices have been prepared. The procedure and a number of related publications with the following articles are available from the WTI. These titles include:

- * Construction and Monitoring of a Field Test Cell to Validate Test Methods for Solidified Waste Evaluation.

- * Solidification Formulation Development for a Specialty Steel Electric Arc Furnace Dust.
- * Quality Control / Quality Assurance Tests for Field Solidification / Stabilization.
- * Use of Rapid Tests to Measure Contaminant Mobility in Cement Solidified Wastes.
- * Variability of Field Solidified Waste.
- * Laboratory, Regulatory and Field Leaching of Solidified Waste.
- * Field-Solidified Waste Properties Over Time.

TECHNOLOGY OPPORTUNITIES

The proposed test methods for solidified waste evaluation will be used by waste generators, providers of solidification / stabilization technology and regulators, to investigate waste management alternatives which are both economically and environmentally acceptable.

Once the test methods have been proved in full-scale applications, potential users should feel more confident in adopting these methods.

PARTNERSHIP IN POLLUTION PREVENTION AND RESOURCE CONSERVATION

The development of this technology assessment procedure for field validation was supported by the Ontario Ministry of the Environment, the British Columbia Ministry of Environment, Land and Parks and Environment Canada under the common tools component of the Development and Demonstration of Site Remediation Technologies program. Expertise and in-kind contributions were made to the project by Laidlaw Environmental Services Ltd., Shaw-Eurocan Environmental Inc., Standard Slag Cement and Lafarge Canada Inc., National Silicates Ltd. and Beachville Lime.

Industrial companies located in Ontario may seek ministry/industry services which will help them to:

- * reduce, reuse and recycle solid waste;
- * clean up historic pollution effectively and destroy hazardous contaminants;
- * reduce or eliminate liquid effluent and gaseous emissions;
- * use energy and water more efficiently.

Equipment and service supply companies can benefit from the information provided on technologies identified for business development.

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Its purpose is to transfer information to Ontario companies about new environmental technologies.

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